

CLAIMS

I claim:

1. A vehicle immobilizer device, comprising:

a switching element comprising first and second contacts electrically connected to a first system of a vehicle so that operation of the first system can be enabled when the first and second contacts are held together, and so that the first system is not operable when the first and second contacts are apart, the first contact being connected to a first source carrying a first voltage, the switching element further comprising a control input capable of receiving a control signal, the switching element causing the first and second contacts to be held together when the control signal is in a first control signal state and causing the first and second contacts to be brought apart when the control signal is not in the first control state;

a connection receiving an immobilizer signal from a security system, the immobilizer signal assuming a first immobilizer signal state when the security system determines to disable the vehicle, the immobilizer signal causing the control signal to assume the first control state when the immobilizer signal is not in the first immobilizer state; and

a biasing circuit receiving the first voltage through the first and second contacts and causing the control signal to assume the first control state when the second contact is connected to the first source through the first contact and the immobilizer signal is not in the first immobilizer state.

2. A vehicle immobilizer device according to claim 1, wherein the switching element is in an energized state when the control signal assumes the first control signal state, and the first switching element is in a de-energized state when the control signal is not in the first control signal state.

3. A vehicle immobilizer device according to claim 1, wherein the switching element comprises a relay and the first and second contacts are normally open contacts of the relay.

4. A vehicle immobilizer device according to claim 1, wherein the first contact is connected to the first source through a switch.
5. A vehicle immobilizer device according to claim 1, further comprising a switch connecting the first contact to the first source, wherein operation of the first system is enabled when the switch is closed and the first and second contacts are held together.
6. A vehicle immobilizer device according to claim 1, wherein the first system comprises an ignition system of the vehicle.
7. A vehicle immobilizer device according to claim 1, wherein the first system comprises an engine computer of the vehicle.
8. A vehicle immobilizer device according to claim 4, further comprising a connection from a supply voltage rail of the security system to the biasing circuit, the connection from the supply voltage rail causing the control signal to assume the first control state when the immobilizer signal is not in the first immobilizer state and the security system receives electrical power.
9. A vehicle immobilizer device according to claim 4, further comprising a terminal set capable of receiving a removable jumper, the terminal set connecting the first voltage to the biasing circuit through the removable jumper to cause the control signal to assume the first control state when the jumper is inserted into the terminal set and the immobilizer signal is not in the first immobilizer state.
10. A vehicle immobilizer device according to claim 4, wherein the immobilizer signal comprises first and second immobilizer signal components, the connection to the security system comprises a first immobilizer signal component connection carrying the first immobilizer signal component and a second immobilizer signal component connection carrying the second immobilizer signal component, the first immobilizer signal component not being identical to the second immobilizer signal component when the immobilizer signal is in the first immobilizer signal state.

11. A vehicle immobilizer device according to claim 4, wherein the biasing circuit comprises a voltage divider.
12. A vehicle immobilizer device according to claim 11, wherein the biasing circuit further comprises a low-pass filter.
13. A vehicle immobilizer device according to claim 4, further comprising the security system.
14. A vehicle immobilizer device according to claim 1, wherein the first system comprises a necessary system of the vehicle.
15. A vehicle immobilizer device according to claim 1, wherein the switching element further comprises third and fourth contacts electrically connected to a second system of the vehicle so that operation of the second system can be enabled when the third and fourth contacts are held together, and so that the second system is not operable when the third and fourth contacts are held apart, the switching element causing the third and fourth contacts to be held together when the control signal is in a first control signal state and causing the third and fourth contacts to be brought apart when the control signal is not in the first control state.
16. A vehicle immobilizer device according to claim 15, wherein the switching element comprises a relay energized when the control signal assumes the first control signal state, the relay being de-energized when the control signal is not in the first control signal state.
17. A vehicle immobilizer device according to claim 15, further comprising a switch connecting the first contact to the first source, wherein operation of the first system is enabled when the switch is closed and the first and second contacts are held together.
18. A vehicle immobilizer device according to claim 17, wherein the first system comprises a necessary system of the vehicle.

19. A vehicle immobilizer device according to claim 17, wherein the first system comprises an ignition system of the vehicle.
20. A vehicle immobilizer device according to claim 17, wherein the first system comprises an engine computer of the vehicle.
21. A vehicle immobilizer device according to claim 18, wherein the second system comprises a starter solenoid of the vehicle.
22. A vehicle immobilizer device according to claim 15, further comprising a connection from supply voltage of the security system to the biasing circuit to cause the control signal to assume the first control state when the immobilizer signal is not in the first immobilizer state.
23. A vehicle immobilizer device according to claim 17, further comprising a terminal set capable of receiving a removable jumper, the terminal set connecting the first voltage to the biasing circuit through the removable jumper to cause the control signal to assume the first control state when the jumper is inserted into the terminal set and the immobilizer signal is not in the first immobilizer state.
24. A vehicle immobilizer device according to claim 15, further comprising the security system.
25. A vehicle immobilizer device according to claim 15, wherein the immobilizer signal comprises first and second immobilizer signal components, the connection to the security system comprises a first immobilizer signal component connection carrying the first immobilizer signal component and a second immobilizer signal component connection carrying the second immobilizer signal component, the first immobilizer signal component not being identical to the second immobilizer signal component when the immobilizer signal is in the first immobilizer signal state.

26. A vehicle immobilizer device according to claim 15, wherein the biasing circuit comprises a voltage divider.

27. A vehicle immobilizer device according to claim 26, wherein the biasing circuit further comprises a low-pass filter.

28. A vehicle immobilizer device, comprising:

a switching element comprising first and second contacts electrically connected to a first system of a vehicle so that operation of the first system can be enabled when the first and second contacts are held together, and so that the first system is not operable when the first and second contacts are apart, the first contact being connected to a first source carrying a first voltage, the switching element further comprising a control input capable of receiving a control signal, the switching element causing the first and second contacts to be held together when the control signal is in a first control signal state and causing the first and second contacts to be brought apart when the control signal is not in the first control state;

a connection receiving an immobilizer signal from a security system, the immobilizer signal comprising first and second immobilizer signal components, the security system putting the immobilizer signal in a first immobilizer signal state when the security system determines to disable the vehicle, the first immobilizer signal component being different from the second immobilizer signal component when the immobilizer signal is in the first immobilizer signal state;

means for causing the control signal to assume the first control state when the immobilizer signal is not in the first immobilizer signal state; and

means for receiving the first voltage through the first and second contacts and causing the control signal to assume the first control state when the second contact is connected to the first source through the first contact and the immobilizer signal is not in the first immobilizer state.

29. A vehicle immobilizer device, comprising:

a switching element comprising first and second contacts electrically connected to a first system of a vehicle so that operation of the first system can be enabled when the first and second contacts are held together, and so that the first system is not operable when the first and second

contacts are apart, the first contact being connected to a first source carrying a first voltage, the switching element further comprising a control input capable of receiving a control signal, the switching element causing the first and second contacts to be held together when the control signal is in a first control signal state and causing the first and second contacts to be brought apart when the control signal is not in the first control state;

a connection receiving an immobilizer signal from a security system, the immobilizer signal assuming a first immobilizer signal state when the security system determines to disable the vehicle, the immobilizer signal causing the control signal to assume the first control state when the immobilizer signal is not in the first immobilizer state; and

means for receiving the first voltage through the first and second contacts and for causing the control signal to assume the first control state when the second contact is connected to the first source through the first contact and the immobilizer signal is not in the first immobilizer state.

30. A vehicle immobilizer device according to claim 29, wherein the switching element comprises a relay and the first and second contacts are normally open contacts of the relay.

31. A vehicle immobilizer device according to claim 29, wherein the first contact is connected to the first source through an ignition switch.

32. A vehicle immobilizer device according to claim 31, further comprising a terminal set capable of receiving a removable jumper, the terminal set connecting the first voltage to the biasing circuit through the removable jumper to cause the control signal to assume the first control state when the jumper is inserted into the terminal set and the immobilizer signal is not in the first immobilizer state.

33. A vehicle immobilizer device according to claim 31, wherein the immobilizer signal comprises first and second immobilizer signal components, the connection to the security system comprises a first immobilizer signal component connection carrying the first immobilizer signal component and a second immobilizer signal component connection carrying the second immobilizer signal component, the first immobilizer signal component not being identical to the

second immobilizer signal component when the immobilizer signal is in the first immobilizer signal state.

34. A vehicle immobilizer, comprising:

a relay comprising first and second normally open contacts, the first contact being connect to a first voltage source carrying a first voltage, the second contact being connected to a first system of a vehicle so that the first voltage can be provided to the first system to enable operation of the first system when the first and second contacts are closed, and so that the first system is not operable when the first and second contacts are open, the first contact being connected to the first voltage source, the relay further comprising first and second solenoid inputs, the first solenoid input being connected to a source of predetermined voltage, the second solenoid input receiving a control signal, the relay causing the first and second contacts to close when the control signal is in a first control signal state and causing the first and second contacts to open when the control signal is not in the first control state;

a connection receiving first and second immobilizer signals from a security system;

a self-biasing control circuit comprising:

a first immobilizer connection receiving a first immobilizer input signal from a security system;

a second immobilizer connection receiving a second immobilizer input signal from the security system;

a biasing connection to the second contact;

wherein the self-biasing control circuit causes the control signal not to be in the first control signal state when the first immobilizer input signal assumes a first level and the second immobilizer input signal assumes a second level substantially not equal to the first level.

35. A vehicle immobilizer according to claim 34, wherein the self-biasing control circuit further comprises a removable jumper receptacle connecting the self-biasing control circuit to the first voltage source.

36. A vehicle immobilizer according to claim 34, wherein the first system comprises an ignition solenoid of a vehicle.

37. A vehicle immobilizer according to claim 34, wherein the first system comprises an engine computer of a vehicle.

38. A vehicle immobilizer according to claim 34, wherein the source of predetermined voltage is the first voltage source.

39. A vehicle immobilizer, comprising:

a relay comprising first and second normally open contacts, the first contact being connected to a voltage source carrying a first voltage, the second contact being connected to a first system of a vehicle so that the first voltage can be provided to the first system to enable operation of the first system when the first and second contacts are closed, and so that the first system is not operable when the first and second contacts are open, the relay further comprising first and second solenoid inputs, the first solenoid input being connected to the voltage source, the relay closing the first and second contacts when voltage on the second solenoid input does not exceed a first predetermined level;

a control circuit comprising:

a first immobilizer connection receiving a first immobilizer input signal;

a second immobilizer connection receiving a second immobilizer input signal, the second immobilizer connection being coupled to the second solenoid input; and

a switch coupled between the second solenoid input and a ground, the switch comprising a switch control input coupled to the first immobilizer connection so that the first immobilizer input signal controls state of the switch, the switch grounding the second solenoid input when the first immobilizer input signal is in a first state, the first state corresponding to voltage exceeding the first predetermined level; and

a biasing circuit providing a biasing voltage from the second contact to the switch control input so that the switch grounds the second solenoid input when the first and second contacts are closed and the first immobilizer input signal assumes a high impedance state.

40. A vehicle immobilizer according to claim 39, wherein the biasing circuit comprises a first resistor coupled between the switch control input and ground, and a second resistor comprising first and second ends, the first end of the second resistor being coupled to the switch control input, the second end of the second resistor being coupled to the second contact.

41. A vehicle immobilizer according to claim 40, further comprising a jumper receptacle coupled between the voltage source and the second end of the second resistor, and a diode coupling the second end of the second resistor to the second contact, the diode being oriented so as to prevent current flow from the first contact to the second contact through the diode.

42. A vehicle immobilizer according to claim 40, further comprising a jumper receptacle and a first diode coupled in series between the voltage source and the second end of the second resistor, and a second diode coupling the second end of the second resistor to the second contact, the first and second diodes being oriented so as to prevent current flow between the first and second contacts through the first and second diodes.

43. A method of controlling operation of a vehicle, the method comprising:

providing a control signal to a first switching element, the first switching element comprising a first contact and a second contact electrically connected to a first vehicle system so that operation of the first vehicle system can be enabled when the first and second contacts are held together, and so that the first vehicle system is not operable when the first and second contacts are held apart, the first contact being connected to a first voltage source carrying a first voltage, the first switching element further comprising at least one control input capable of receiving the control signal, the first switching element causing the first and second contacts to be held together when the control signal assumes a first control signal state and causing the first and second contacts to be brought apart when the control signal does not assume the first control signal state;

providing an immobilizer signal from a security system, the immobilizer signal assuming a first immobilizer signal state when the security system determines to disable the vehicle, the immobilizer signal causing the control signal to assume the first control signal state when the immobilizer signal assumes the first immobilizer state; and

providing the first voltage from the first voltage source to a biasing circuit through the first and second contacts, the biasing circuit causing the control signal to assume the first control state when the second contact is connected to the first voltage source through the first contact and the immobilizer signal is not in the first immobilizer state.

44. A method in accordance with claim 43, wherein the first switching element is in energized state when the control signal assumes the first control signal state, and the first switching element is in de-energized state when the control signal is not in the first control signal state.

45. A method in accordance with claim 43, wherein the first switching element comprises a relay energized when the control signal assumes the first control signal state, the relay being de-energized when the control signal is not in the first control signal state, and the step of providing a control signal comprises a step of providing the control signal to the relay.

46. A method in accordance with claim 44, further comprising a step of disabling the first vehicle system, the step of disabling comprising a step of disconnecting the first voltage source from the first contact.

47. A method in accordance with claim 46, wherein:

the first vehicle system comprises an ignition system, and the step of disabling comprises disabling the ignition system.

48. A method in accordance with claim 46, wherein the first vehicle system comprises an engine computer, and the step of disabling comprises disabling the ignition system.

49. A method in accordance with claim 46, further comprising a step of providing a supply voltage from the security system to the biasing circuit to cause the control signal to assume the first control state when the immobilizer signal is not in the first immobilizer state.

50. A method in accordance with claim 46, further comprising a step of providing the first voltage to the biasing circuit through a removable jumper to cause the control signal to assume the first control state when the jumper is inserted and the immobilizer signal is not in the first immobilizer state.

51. A method in accordance with claim 46, further comprising a step of providing the security system.

52. A method in accordance with claim 46, wherein the immobilizer signal comprises first and second immobilizer signal components, the first immobilizer signal component not being identical to the second immobilizer signal component when the immobilizer signal is in the first immobilizer signal state.

53. A method in accordance with claim 43, further comprising a step of providing the control signal to a second switching element, the second switching element comprising a third and fourth contacts electrically connected to a second vehicle system so that operation of the second vehicle system can be enabled when the third and fourth contacts are held together, and so that the second vehicle system is not operable when the third and fourth contacts are held apart, the second switching element further comprising at least one second control input capable of receiving the control signal, the second switching element causing the third and fourth contacts to be held together when the control signal assumes a first control signal state and causing the third and fourth contacts to be brought apart when the control signal does not assume the first control signal state.

54. A method in accordance with claim 53, wherein:

the first switching element comprises a first relay energized when the control signal assumes the first control signal state, the first relay being de-energized when the control signal is not in the first control signal state; and

the second switching element comprises a second relay energized when the control signal assumes the first control signal state, the second relay being de-energized when the control signal is not in the first control signal state.

55. A method in accordance with claim 54, further comprising:
disabling the first vehicle system, the step of disabling the first vehicle system comprising a step of disconnecting the first voltage source from the first contact; and
disabling the second vehicle system.
56. A method in accordance with claim 54, further comprising a step of providing a supply voltage from the security system to the biasing circuit to cause the control signal to assume the first control state when the immobilizer signal is not in the first immobilizer state.
57. A method in accordance with claim 54, further comprising a step of providing the first voltage to the biasing circuit through a removable jumper to cause the control signal to assume the first control state when the jumper is inserted and the immobilizer signal is not in the first immobilizer state.
58. A method in accordance with claim 54, further comprising a step of providing the security system.
59. A method in accordance with claim 54, wherein the immobilizer signal comprises first and second immobilizer signal components, the first immobilizer signal component not being identical to the second immobilizer signal component when the immobilizer signal is in the first immobilizer signal state.